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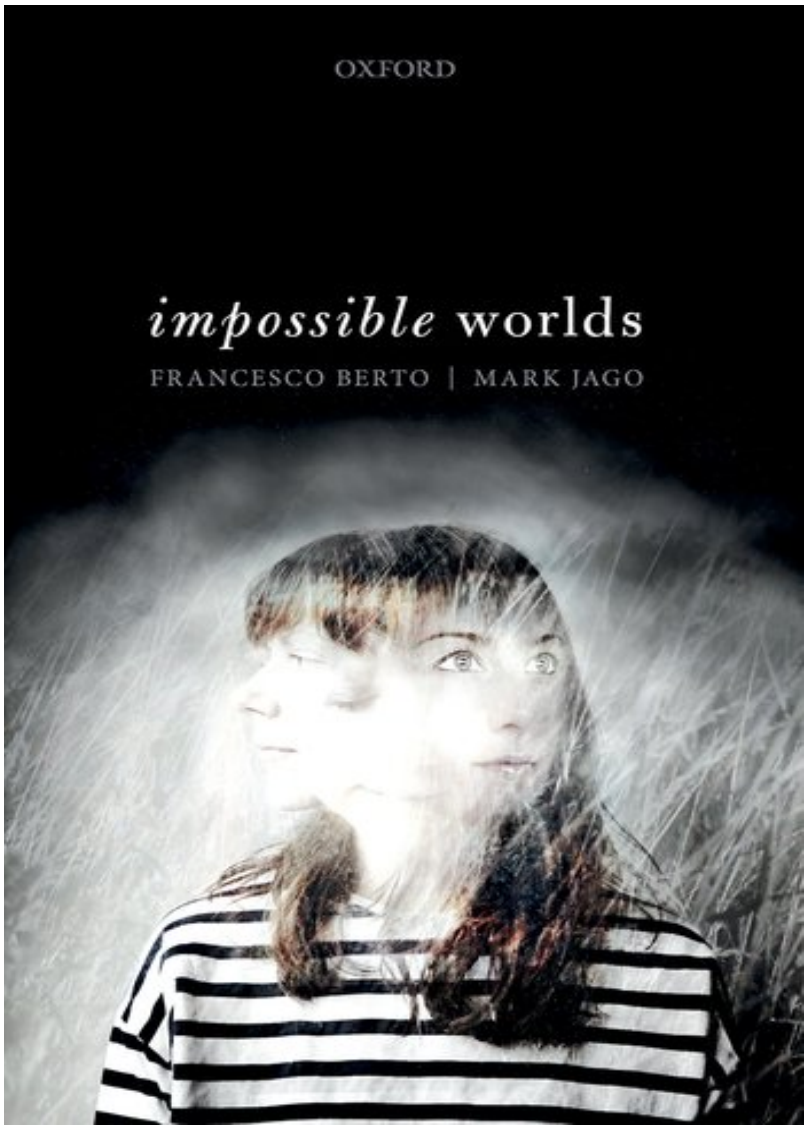

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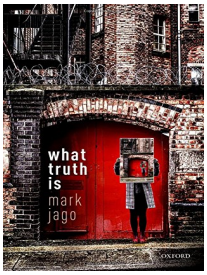

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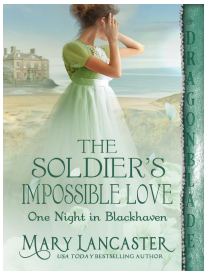

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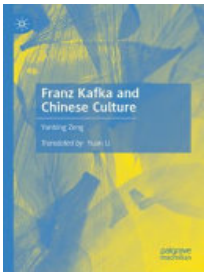

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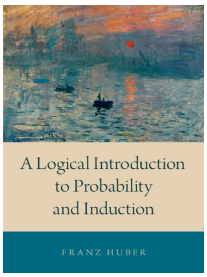

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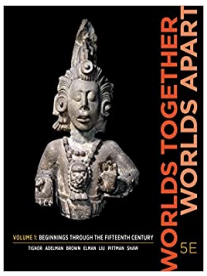

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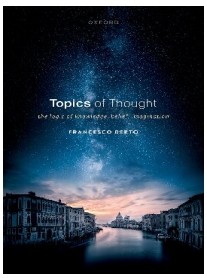

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impossible worlds

FRANCESCO BERTO | MARK JAGO

Impossible Worlds

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Francesco Berto and Mark Jago

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For Anna and Valeria

Contents

Introduction

The latter half of the twentieth century witnessed an 'intensional revolution': a great collective effort to analyse notions which are absolutely fundamental to our understanding of the world and of ourselves – from meaning and information to knowledge, belief, causation, essence, supervenience, conditionality, as well as nomological, metaphysical, and logical necessity – in terms of a single concept. This was the concept of a *possible world*: a way things could have been.

Possible worlds found applications in logic, metaphysics, semantics, game theory, information theory, artificial intelligence, the philosophy of mind and cognition. In 1986, in *On the Plurality of Worlds*, David Lewis called possible worlds 'a philosophers' paradise'. Whatever view one had on the kinds of things possible worlds are, there was widespread agreement on their being an indispensable theoretical tool.

That paradise has turned out to be full of problems. These have emerged in piecemeal fashion, as difficulties for this or that application of the possible worlds paradigm. It seems to us, however, that the difficulties revolve around a single issue. Most of those fundamental notions are *hyperintensional*: they require distinctions the standard possible worlds apparatus cannot easily make.

When we set out to write about impossible worlds – ways things could *not* have been – we decided to set our narrative against the background of an envisaged twenty-first century 'hyperintensional revolution'. A number of accounts have been developed, which

qualify as hyperintensional in some sense. They range from two-dimensional semantics (Chalmers 2006), to theories of aboutness (Yablo 2014), truthmaker semantics (Fine 2017), metaphysical grounding (Correia and Schnieder 2012), structured propositions (King 2011), transparent intensional logic (Duzi et al. 2010), and various non-classical logical approaches (Dunn and Restall 2002). How such theories, or families thereof, are connected to each other and how their relative merits can be assessed, are at present largely open questions. But whatever position impossible worlds take in this landscape, we believe that they will play a role in the revolution, and we felt the time was ripe for a book providing guidance through the burgeoning literature on the subject.

This book includes an opinionated introduction to theories and uses of impossible worlds. (A shorter and simplified presentation can be found in our 'Impossible Worlds' entry in the *Stanford Encyclopedia of Philosophy*.) We have our own preferences on the metaphysics of impossible worlds and the logical and philosophical applications they afford. We don't hide those preferences; but we have tried to provide fair accounts of the alternative views and to assess them in a balanced way.

The book also includes our own original proposals on a number of topics involving impossible worlds. Some of these have appeared previously in print, although often not in the form they appear here. We have drawn on material from Berto's papers 'Impossible Worlds and Propositions' (*The Philosophical Quarterly*, 2010), 'On Conceiving the Inconsistent' (*Proceedings of the Aristotelian Society*, 2014), 'Impossible Worlds and the Logic of Imagination' (*Erkenntnis*, 2017), 'Conceivability and Possibility: Some Dilemmas for Humeans' (with Tom Schoonen, *Synthese*, 2018), 'Truth in Fiction, Impossible Worlds, and Belief Revision' (with Chris Badura, *Australasian Journal of Philosophy*, 2018), 'Williamson on Counterpossibles' (with Rohan French, Graham Priest, and Dave Ripley, *Journal of Philosophical Logic*, 2018), and on Berto's book *Ontology and Metaontology* (with Matteo Plebani, Bloomsbury, 2015). We have drawn on material from Jago's papers 'Against Yagisawa's Modal Realism' (*Analysis*, 2013),

'The Content of Deduction' (*Journal of Philosophical Logic*, 2013), 'Recent Work in Relevant Logic' (*Analysis*, 2013), 'The Problem of Rational Knowledge' (*Erkenntnis*, 2013), and on Jago's book *The Impossible* (Oxford University Press, 2014). We are very grateful to all the editors and publishers for permission to use these works.

Outline of the Book

The book is divided into three parts. Part I deals with foundational issues. In Chapter 1, we survey a number of applications of possible worlds; find them all wanting; trace the problem back to hyperintensionality; and suggest that impossible worlds may help. We present various definitions of the notion of an impossible world from the literature. Such worlds make sense only if we can genuinely think about the impossibilities they represent. We argue that we can.

A central philosophical issue with worlds, possible or impossible, is how they represent what they represent. This is obviously connected to the problem of what kind of things they are. In Chapter 2, we discuss a number of different proposals. Perhaps impossible worlds are metaphysically different from possible worlds, and represent in a different way. Or perhaps they are metaphysically on a par with possible worlds. Impossible worlds may be taken as 'genuine' entities which, like Lewisian possible worlds, represent something as being an *F* by having a real *F* as a part. Or, they may be taken as non-existent objects. Or as abstract entities which, like the objects of general object theory, represent by encoding. Or they may be taken as primitive entities, with no questions asked on how they represent. Or maybe there are no such worlds: we should take a fictionalist stance, and just make believe that there are.

We argue that all such views face difficulties, and conclude that some *ersatz* approach fares the best. After characterizing the notion of an ersatz world in general terms, we notice that there are different ways to specify the view. We delve into the options in Chapter 3. Ersatz possible worlds can be understood as maximal

states of affairs, maximal properties, recombinations of bits of actuality, maps, or things built out of propositions or sentences. We argue that, when extended to impossible worlds, most of these approaches face issues: they either collapse into other views, or are not general enough to accommodate all the impossibilites we may want. We conclude that linguistic ersatzism, which views worlds as constructions from sentences of a 'worldmaking' language, is the most promising metaphysics of impossible worlds. We close Chapter 3 by discussing a problem it, together with the other variants of ersatzism, faces: the problem of aliens.

Parts II and III of the book are about the logical and philosophical applications of impossible worlds. The boundary between logic and philosophy is to some extent arbitrary, as is our partition of the topics. Part II covers epistemic, doxastic, and various non-classical logics. Part III covers applications connected to issues in mainstream epistemology, information theory, the philosophy of fiction, and topics in semantics and the philosophy of language. But Part II is not completely free from philosophical discussion and Part III is not completely devoid of formalism, although we have tried to keep technicalities under control throughout the book.

In Part II, Chapter 4, we introduce normal modal logics and their frame semantics. We then show how impossible worlds can be used to model *non-normal* modal logics, in which the Rule of Necessitation is not valid. We discuss further uses, involving *non-adjunctiveness* and *non-primeness*. Two general patterns emerge in these applications. Firstly, impossible worlds are generally understood as 'logic violators': worlds where some logical law fails. Secondly, in semantics of this kind truth conditions are often not spelled out uniformly: they differ between possible and impossible worlds. This raises a philosophical problem, whose discussion is postponed until Part III: what of compositionality, a basic requirement for a theory of meaning?

Chapter 5 deals with applications in epistemic and doxastic logic. Here the central topic is the problem of logical omniscience. The standard view models agents as knowing or believing all logical

truths and all logical consequences of what they know or believe. We discuss some approaches to avoiding this consequence which don't use impossible worlds, and find them wanting. A naïve impossible worlds approach can easily deliver a view which avoids this problem. But it faces a deeper problem of *bounded rationality*: how should the accessible impossible worlds be constrained, so as to model a moderately rational though not logically omniscient agent? We argue that closing worlds under a weaker-than-classical logic won't help. We also critically discuss a dynamic approach using impossible worlds, on which epistemic states evolve gradually towards closure.

Chapter 6 deals with the role impossible worlds play in the semantics of relevant logics. These are non-classical logics that aim to avoid the paradoxes of the material and strict conditional. The mainstream semantics here includes non-normal points of evaluation, which are naturally interpreted as impossible worlds. The discussion has revolved around making sense of the truth conditions for the relevant conditional and negation. We discuss information-theoretic interpretations of impossible worlds in this setting, and raise some issues. We also discuss interpretations guided by general views on conditionality and an interpretation in terms of truthmaking.

Chapter 7 presents an application of impossible worlds to modelling acts of imagination. We focus on a semantics for hyperintensional operators capturing a kind of mental simulation. We discuss a number of plausible constraints on such operators, including non-monotonicity, non-primeness, and a 'Principle of Imaginative Equivalents' that limits the hyperintensional anarchy of imagining.

In Part III, Chapter 8 revolves around a very general philosophical issue: is hyperintensionality a genuine phenomenon? Or is it a feature to be explained away, and which therefore does not require us to amend the standard possible worlds apparatus? We consider arguments for the latter view, and find them unsuccessful. We then focus on a general notion of hyperintensional content, and discuss two issues concerning it. Firstly, any hyperintensional theory of content must address the problem of granularity: how fine-grained must the relevant hyperintensional distinctions be? Secondly, we return to the

issue, flagged in Chapter 4, of non-uniform truth conditions, which raises a compositionality objection for theories of content. We argue that impossible worlds accounts can deliver a fully compositional theory of content.

Chapter 9 is about information, which we conceptualize semantically, in terms of ruling out scenarios. We argue that Frege's puzzle of informative identities, and the informativeness of logical inferences, can be accounted for hyperintensionally, using impossible worlds. In our favourite analysis, it may be indeterminate whether a given logical inference is informative. We also sketch an analysis of informative content in terms of what is said by a speaker making an utterance.

Chapter 10 deals with epistemic and doxastic contents. Here we focus on how to model a realistic cognitive agent, striking a balance between the implausible extremes of logical omniscience and complete logical ignorance. This is the problem of bounded rationality, flagged in Chapter 5. The belief states of such an agent seem to be closed under 'easy', trivial logical consequence, but not under full logical consequence. Yet the former seems to imply the latter. Our solution is that, while some trivial closure principle must fail in a belief state, it is indeterminate just where any such failure occurs. We give formal models of belief states so structured. These entail that nobody genuinely believes an outright contradiction. We close the chapter discussing the issue of people who claim they do.

Chapter 11, written with Chris Badura, applies impossible worlds to the analysis of truth in fiction and the metaphysics of fictional objects. We show that inconsistent fictions are naturally handled via a space of worlds including impossible worlds, and that truth in fiction can be understood as a kind of simulated belief revision over such a space, triggered by the fiction's explicit content. We then discuss fictionalist, realist, and Meinongian accounts of fictional characters, their problems, and their relative merits. We show how impossible worlds can help to improve on some of these accounts.

Chapter 12, written with Rohan French, Graham Priest, and Dave Ripley, is about counterfactuality. The starting point here is the intuitive view that counterpossibles – counterfactual conditionals

with impossible antecedents – are not all vacuously true, independently of the truth value of the consequent. We discuss objections to the effect that this intuition should be explained away, and find them unconvincing. We then offer a non-vacuist semantics for counterpossibles that resorts to impossible worlds. This triggers a discussion of the so-called 'Strangeness of Impossibility Condition' (SIC). This relates to the idea that some pairs of worlds are closer to one another than others, and that we evaluate counterfactuals by considering the closest worlds. The (SIC), then, holds that, for any given possible world, any impossible world is further away from it than any possible world is. In the semantics, the substitutivity of rigidly coreferential terms fails in counterfactual contexts. This is arguably a problem. Another objection revolves around making sense of arguments by *reductio ad absurdum* in mathematical practice. We argue that both objections can be met.

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Part I

Impossibilities

1

From Possible to Impossible Worlds

1.1 Worlds as Ways

Things might have been otherwise. David Bowie may still have been with us, the sun may have been shining on Nottingham, and the Axis powers may have won the Second World War. Such alternative ways we call *possible worlds*. Each possible world is a way things could have been. (This initial characterization says nothing of what possible worlds are, metaphysically speaking. That's the topic of Chapters 2 and 3.) The actual world is the most general and comprehensive way in which things in fact are. In the actual world, the Nazis lost the Second World War, the sky one of us sees from his office in Nottingham is cloudy, and David Bowie died at the beginning of 2016.

Ways things could have been can resemble the way things actually are. A world where the Axis powers won the Second World War is still a world where there was a war in which the Nazis fought, though with a different outcome from the actual world. Some possible worlds involve only small changes from ours: think of a world exactly like the actual one, except that you are one inch taller. Others are very different: think of one where the laws of biology and physics are turned upside down, so that you can be born twice, or travel faster than the speed of light. As we will see, the idea that it makes sense to speak of relations of similarity between possible worlds is important for some applications.

Exploring the Variety of Random Documents with Different Content

soon looks shabby.

There is now such a quantity of cheap literature that is not likely to last, or to be wanted to last, that there is a large and increasing demand for cheap binding materials other than leather. So there is an important future for specially prepared binding cloths and buckrams. The only libraries that are likely to suffer by the more general introduction of such materials are the few large ones that are obliged to keep all their books, old or new, in working order inside and outside.

Account book bindings are peculiar and very strong. They have been used for a long time in banks and business houses, and are purely utilitarian and comparatively quite modern.

Strong sound paper is an essential for account books. The sewing is done in the flexible style, but on broad flat bands of vellum or leather instead of raised bands of hemp. The ends of the bands are fixed between two boards, pairs of which form the boards of the book. The space between the edge of the back of the book where the bands leave it and their inset to the boards is not drawn close, but a narrow margin is left so that a perfectly flexible and strong leather joint is left. In small books this peculiarity is known as a French joint, and it obviates the common failing of sides falling away from otherwise sound bindings along the joint-line at the back.

The back of account book bindings looks very strong, but it is really nothing of the sort. It is only a show back, to take the lettering and cover up the real joints, which are securely laid along the edges of the boards.

When an account book is opened it “sets up” so that it can be easily read right down to the sewing at the back. This is of great value in many cases other than the keeping of accounts, and it is the only advantage of the common, but weak, bindings with “hollow” backs. But there is no doubt that a modified form of account book binding, with a French joint, is a style which might with advantage be studied by our modern art binders.

The study of end papers is to some extent necessary for the true judgment of the work of certain binders. For instance, Thomas Berthelet normally used white end papers, Samuel Mearne used red marbled end papers, and Roger Payne used purple or pink end papers. The Italian binder who worked for Grolier used vellum for end paper, and so on. The knowledge of such details is useful in detecting frauds, as they are apt to be under-estimated in importance by a forger.

Of all end papers the most common is marbled paper, and one of the most curious usages of it is when a beautiful and delicate French binding has a charmingly gold tooled doublure of splendid leather faced by a wretched leaf of marbled paper.

The usual marbled paper is made by means of a bed of size on which colour is sprinkled by a brush, the colour lies on the top of the size and is moved about by means of a wide-toothed comb or a pin or anything that is handy, until the resulting pattern is to the satisfaction of the operator. Then the paper is laid down in the size, and when raised up it brings all the colour with it. It is generally easy to see how the pattern has been made by looking at the paper, and it will be found that the most usual forms have been made by the use of a broad-toothed comb. I should think that the process might well have produced something better than it ever has; undoubtedly if J. M. Whistler had ever known of it we should have had some remarkable results.

Marbling is probably of Oriental origin, and was most likely first practised in Germany, so far as Europe is concerned. It was certainly understood in Nuremberg in 1599, as specimens made there are to be seen in the *Album Amicorum*, of J. Cellarius, of that date. It is, of course, obviously capable of endless modifications, and of late years some very delicately and prettily coloured end papers have been made.

More or less in continuation of the mediæval fashion of covering book-bindings with richly-worked metal overlays, we find, in the seventeenth and eighteenth centuries particularly, numbers of small

books bound in metal or with metal enrichments in the form of centrepieces and cornerpieces. Clasps occur all along, and although I hardly think that they have followed out any very marked line of development, I expect that some day a careful study will be made of them, when some such development may possibly be discovered. No student, as far as I am aware, has made any attempt to classify book clasps.

But the English, German, French, Italian, and Dutch bindings with metal enrichments are pretty well known and generally admired. The English are the finest by far, and, as far as I can ascertain, the earliest. In the reign of Henry VIII. it was the fashion for ladies to carry small books of devotion at their girdle. These little books were always ornamental, and they had a ring fixed on the lower edge of the binding so that when the book was lifted up it came right for reading. One of these belonged to one of the queens of Henry VIII.; it is a copy of the Psalms, and is bound in gold with a delicate leafy spray in high relief. On it are remains of enamel, and in the beginning is a tiny miniature of the king.

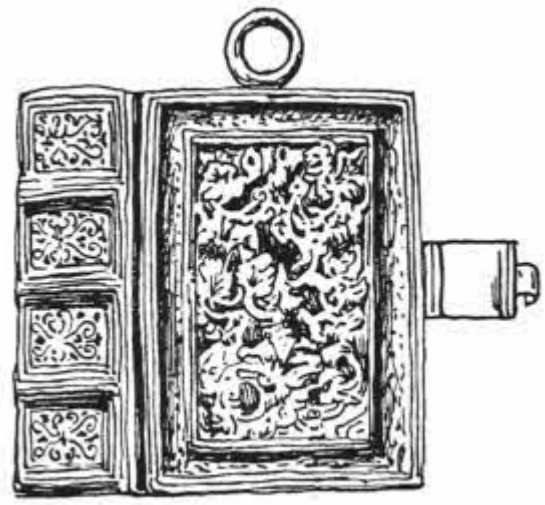

Fig. 81.—English golden book, made for Henry VIII.

Another beautiful little golden book with a design, probably by Holbein, in black enamel, is now the property of Lord Romney.

Several small golden bindings with scriptural subjects in high relief and enamelled were made late in the sixteenth century. Most of these are now divorced from their original texts, and are only kept as specimens of enamel work, but in one instance the whole book is perfect. This is a little book of prayers that belonged to Queen

Elizabeth. On one side of it is the Serpent in the Wilderness and on the other the Judgment of Solomon.

For the same queen a little copy of *Christian Meditations* was bound in red velvet with golden centrepieces, corners, and clasps. The enamels in this case are champlevé, and still perfect in colour. They are said to have been the work of George Heriot, Elizabeth's goldsmith, who founded a hospital in Edinburgh.

James VI. of Scotland wrote the βασιλικον Δωρον for his son Henry, and the precious MS. was bound in purple velvet with golden centrepiece and clasps. The gold is cut out thin and then finished by engraving. When king of England James had some of his books bound in velvet with silver enrichments. On one of these, a little book of *Christian Meditations*, which is bound in purple velvet, the royal coat-of-arms is engraved on the centre oval, and on the corners are the national crests of England and Scotland, the crowned harp of Ireland, and the fleur-de-lis of France.

A beautiful little New Testament of 1643 with silver portraits of Charles I. and Queen Henrietta Maria, and cornerpieces and clasps engraved with allegorical figures, shows that metal on velvet was still a popular style, but on later bindings in England metal centrepieces fell quite out of use. Metal corners, however, were still used for some time, and clasps occasionally.

Bindings entirely of silver are rare in English workmanship, but they were not unknown, as a fine specimen with a repoussé figure of Charity covers a Common Prayer of 1632.

Of German and Dutch workmanship many metal bindings exist, and they are of varied styles. All these bindings have solid metal backs with hinges along the sides, and usually a sort of cap projecting over the headband. Many of the later examples are not good, but are made of bad metal and coarsely worked in repoussé. The worst of them are probably Dutch work.

Some of the earlier German silver bindings are prettily ornamented with niello work, and others have filigree work over gilt metal, and

the use of tortoiseshell with silver or gilt mounts is also found of Spanish, German, or Dutch workmanship. I should say that the best guide to determine to which of these countries the work belongs is to take the place of imprint as authoritative. The imprint on a printed book does not by any means always imply that a binding was made there, but in many doubtful cases it is undoubtedly of much value as to mere nationality; the style of the binding itself should always be the first consideration. Some Dutch bindings are made in base metal, gilt, often with open work and engraving. They are neither good to look upon nor pleasant to handle.

Fig. 82.—German binding in silver filigree and niello.

Italian bindings in metal are rare, and it is only in the case of very small books that it was ever used. The manner of this is usually fine filigree work over a gilt groundwork. There is one example in the Victoria and Albert Museum, which is, however, more likely to be quite an exceptional production than one in any way representing a national type. It is an exquisitely enamelled golden book cover, having on one side the Garden of Eden and on the other the Fountain of Youth; it contains a missal, and is said to have been made for Queen Henrietta Maria.

In France a few silver bindings of the sixteenth century with enamels have been made, but they are very rare, and the enamels of the basse taille style, usually badly chipped.

I believe some small metal bindings with rough enamels upon them have been made in comparatively modern times in Russia. These all have a strong Byzantine feeling and are clear survivals of the same style that was in vogue in Russia in mediæval times, and was used not only for bindings but also for ikons and triptychs. The work is coarse and unsatisfactory.

Fig. 83.—Dutch binding in tortoiseshell and silver.

Tortoiseshell mounted in metal has been largely used for bindings in Holland, Germany, and Spain. The backs are hinged to the sides with long snuff-box hinges, and the shell itself is sometimes beautifully inlaid with silver and mother-of-pearl. Some of these covers are very small, particularly the Dutch ones, and designs are sometimes impressed upon them.

Mother-of-pearl has now and then been utilised for binding very small books. The backs and hinges are usually of silver.

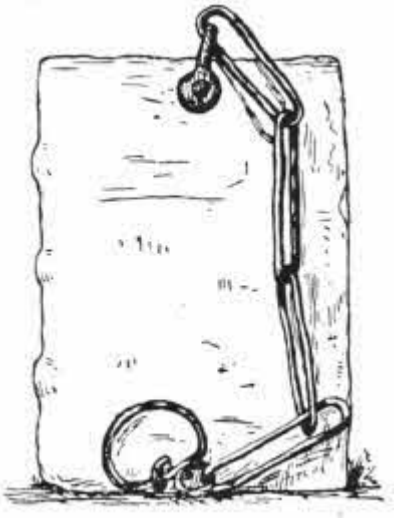

Fig. 84.—German chained book, fifteenth century.

The curious custom of fastening books to their shelves by means of chains was common enough in Europe in mediæval times and became almost universal in the sixteenth and seventeenth centuries in churches. It was of course done as a safeguard against thieves, and as far as I know only in the case of printed books. Although printed books soon became plentiful, yet no doubt in the case of Bibles and Prayer Books it is likely enough that a considerable leakage took place. Such small books were commonly chained to the backs of the pews in private chapels throughout England, and undoubtedly the custom, though inconvenient in use, was effective enough for its purpose.

Larger books would naturally belong to important libraries, those of cathedrals and churches particularly, and of these there are still left plenty of examples still in chains.

The chains are of iron, average 3 feet long, and are clamped to the front edge of the upper board by means of a rivet; the other end of the chain is provided with a ring which runs freely to and fro along a locked metal rod. Enough play is given by the chain to allow of the book being taken off its shelf and rested on the desk close at hand which is always provided for it.

There is a certain fashion in the way of attaching these chains. In foreign books the fastening is usually found at the top of the upper board, while in the case of English books it is usually fixed on the front edge of the upper board. The books were normally kept with their forages outwards, and on these edges the titles were written or emblazoned.

The Laurentian Library at Florence has a large number of chained books kept in beautifully carved shelves.

The Church of St. Wallberg in Zutphen has several chained books. There is a legend that the devil carried off so many of the holy books that something had to be done, so the chains were blessed in due form with holy water, since when the books have been safely preserved.

Plenty of examples of chained libraries are still left in England, particularly at Hereford Cathedral, the old treasure house at Wimborne Minster and All Saints' Church at Hereford; a complete list of them is given in Blades' "Books in Chains," published in London in 1892.

The inconvenience of chains must have been considerable, and no doubt careless readers often got into trouble about them. On a notice concerning the library at King's College, Cambridge, in 1683, readers are requested to replace the volumes "decently without entangling the chains."

About the middle of the eighteenth century the inconvenience of chains on books was fully realised, and from that time there has been a general tendency to their removal, except in cases where their retention is advisable for antiquarian reasons.

True horn books were used in England and America, but similar constructions also existed in other countries—chiefly France, Germany, Italy, and Holland—but without horn covering.

They were for children's use, and the alphabet and the Lord's Prayer are the commonest letterings upon them, always beginning with a cross, giving the first line the name of the "Christ cross" or "criss cross" row. The paper for true horn books is printed only on one side, and then laid down upon a flat piece of wood. Some unused eighteenth century horn book sheets are preserved in the Bagford fragments at the British Museum. Over the printed slip a piece of horn is put, kept in place by strips of brass fastened with nails having facetted tops, but it must be noted that after about 1820 the facetted tops were often replaced by flat heads.


A a b c d e f g h i j k l m n o p q
r ſ s t u v w x y z & a e i o u
A B C D E F G H I J K L M N O P Q
R S T U V W X Y Z
a e i o u | a e i o u
ab eb ib ob ub | ba be bi bo bu
ac ec ic oc uc | ca ce ci co cu
ad ed id od ud | da de di do du
In the Name of the Father & of the Son. & of the Holy Ghoſt Amen
OUR Father, which art in Heaven, hallowed be thy Name, thy Kingdom come, thy Will be done on Earth, as it is in Heaven. Give us this Day our daily Bread, and forgive us our Treſpaſſes, as we forgive them that Treſpaſs againſt us: And lead us not into Temptation, but deliver us from Evil. Amen

Fig. 85.—English seventeenth century horn book.

Like all books or objects which were originally cheap and common, horn books are now very rare, but they are so valuable that it is unluckily worth while to imitate them, and many fraudulent modern specimens are about. A horn book is, unfortunately, easy to copy, and it is sometimes a very difficult thing to say positively whether a given specimen is genuinely old or not. Modern frauds are often wrong in either the printing, the paper, the horn, or the nails, but they are often right as to the wood, which is easily made to have every proper appearance of age by means of soaking in water, rubbing

with sand, staining by ammonia, and so on. Collectors should, if possible, get a properly authenticated history with every specimen offered to them.

Small plaques for teaching the alphabet seem to have existed before the invention of printing, but in printed form they were most used towards the end of the sixteenth century until the nineteenth, when their character altered, the wooden frame and its horn covering disappeared, and a degenerate production in varnished cardboard, preserving the old form in some respects, took their place. These cards are often called battledores, but this name was an old one, and originally used for true horn books. The name battledore is probably derived from the batlet, which was used for beating clothes, the horn books somewhat resembling this in shape.

Although the general run of horn books are simple, there are many instances in which they have been decorated; a certain analogy thus exists between the diptychs and the horn books. Lord Egerton of Tatton has a beautiful sixteenth century example, the back of which is ornamented with silver filigree work, and horn books backed with Dutch silver, engraved, are sometimes found. These generally have a bird or a tulip engraved upon them.

Other ornamental examples are to be found in the Birmingham Museum and in private ownership. They are very decorative, and some of them have talc instead of horn in front.

In 1851 some curious stone moulds were found at Hartley Castle by Sir George Musgrave, and one of them was undoubtedly used for casting lead “horn” books, and similar moulds have been found in Germany; the English ones may have been made about the earlier half of the sixteenth century.

But more curious devices were found on the other side of the same piece of stone: these are undoubtedly the emblems of saints’ days as shown on clog almanacks of the same period, so that the horn books may possibly have originated from the makers of cast leaden almanacks.

Horn books were also cut in ivory or bone, often with designs engraved on the back or on the handle. The lettering and devices were originally run in with heelball or some such material. They were also made of boxwood with letters burnt in, or engraved pewter, or gingerbread, and sometimes covered in paper with panel stamp impressions in blind or black ink.

Several of the later seventeenth and early eighteenth century horn books were covered with leather and stamped in blind, gold, silver, or, in Dutch examples, Dutch metal, which nearly always turns black, from panel stamps; sometimes the designs were arabesques or flowers, and at other times we find figures of saints or kings—St. George and the Dragon, mermaids, and the like—and several of Charles II. on horseback, the Duke of Cumberland, and other great people.

These same stamps are also often impressed on paper backs as well as on leather.

The late cardboard horn books either leave out the cross at the beginning or replace it by a meaningless X; they also often show additional alphabets with little wood-cut illustrations. At last the horn book form is quite lost, and at last we find folded pieces of cardboard with stamped or marbled backs, retaining only the alphabet to show that they are survivals.

WORKS TO CONSULT.

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CHAPTER VII.

LEATHERS.

Vellum—Calf—Pig skin—Sheep skin—Goat skin—Seal skin, etc.

Prepared skins of animals have been the most generally used of all materials for covering bindings of manuscripts or printed books. Leather is tanned skin, and the hair is generally removed. Bindings that have the hair still left on the leather are usually of an elementary kind and are intended to be carried about in pockets. They are not common. Vellum (calf skin), and parchment (sheep skin), are not tanned, but are prepared with lime and are white. Not uncommonly, especially in Germany, other skins were so prepared. Pig skin, deer skin, goat skin, horse skin, and donkey skin were all "vellumised," and are all very strong and take excellent impressions in blind.

It is likely enough that vellum was used for the first covering of books, simply enclosing the sections, the ends of the bands drawn in, without boards. Such bindings are excellent for thin books, and they were successfully re-introduced in recent times by William Morris, always used with ties, as otherwise the vellum crinkles up.

"Vellum" bindings made now, unless specially ordered, are only ordinary bindings in boards covered with vellum. Vellum is strong, but has some disadvantages. Although gold looks beautiful upon vellum it is difficult to work, and title labels do not stick to it well. If kept near the light it turns to something very like egg-shell and chips off. This defect was known to librarians in past times, and they met it by keeping their vellum books backs inwards, the forages outwards. Many instances of this manner of keeping vellum books occur in the Bodleian Library at Oxford, and they generally have

their old pressmarks, and sometimes titles, written across the top of the forage. Old vellum was cut thick, and seldom ornamented, and if kept dry in the dark it is an excellent material. The same peculiarities exist in the case of parchment, which is, however, a very inferior skin, thinner, weaker, and not so good looking. Parchment is frequently described, and used, as vellum, and few purchasers know the difference; but the market value of parchment is less than half that of vellum. Vellum is particularly well suited for bindings kept in large towns, as dust does not stick to it, and it is easily cleaned. In time it assumes a creamy colour that is delightful. From the late sixteenth century until now, vellum stained green has been commonly used in England.

White vellumised leather, probably deer skin, has always been much liked in England from the time of Henry VIII., many of whose books were bound in this material: among them a copy of Elyot's "Image of Governance," printed in London in 1541, which is one of the first books with gold tooling upon it done in this country. Several books were bound in the same thick white leather for the other Tudor sovereigns, as well as for some of their richer subjects, but in the seventeenth century limp vellum once more asserted its sway and became very popular in England for highly valued books. The brilliancy of the gilding upon some of these bindings is quite wonderful; it is certainly doubtful if any modern finishers could equal the technical beauty of the work. Then in the eighteenth century, vellum, though still much esteemed, only took its place as a covering for boards, and once more, in the nineteenth century, Morris restored it to its proper use as a limp binding.

In 1785, James Edwards of Halifax patented a way of rendering vellum transparent, so that paintings underneath it showed through, and he used it with much success. The process has been revived of late years in England.

The Dutch binders have always liked vellum, but it is used with boards and never limp. Dutch vellum bindings are usually coloured,

not well done, but at a distance they look decorative, and were certainly very popular. They often have clasps and painted edges.

A few bindings have been made in England, France, and Holland, covered with pierced vellum, showing coloured silk underneath. They are not very satisfactory and soon get out of order.

After vellum comes calf, the outer skin of the same animal, tanned. Calf is a good second, and I think altogether, up to about the end of the eighteenth century, that it has been more used than any other leather. The main difference between old calf and modern calf is that the old leather was properly tanned with oak bark or sumach, and cut thick, whereas modern calf used for binding is abominably tanned, quickly and disastrously, and cut thin. There is no better leather than old calf, and it was used universally; England, France, Germany, and Italy all liked it; it was delightful to decorate, either in blind or gilt, and it mellowed with age to a rich mahogany brown. Italian and sixteenth century English binders stained their fillets black, and several of these calf bindings, richly gilded, and with black fillets, are quite splendid, in perfect taste.

The surface of calf is smooth, and it is very sensitive to all sorts of stains.

Calf is seen at its best when it is used to take impressions from panel stamps, but its beautiful surface and sensitiveness to stains of all kinds has made it a favourite ground for all sorts of fancy markings, most of which, however charming they may be at first, end by destroying the leather.

Russia leather is calf prepared with willow bark and scented with birch oil. It is a modern leather, and lasts badly, and is generally diced,—that is to say, covered all over with diagonal rulings. It was a favourite leather of Roger Payne’s. It is said that a book bound in Russia leather will last better if much used, and no doubt this is true, not only of Russia but of any other leather. As a rule leather bindings in libraries are starved; they get dry, and readily absorb animal oil from the human hand. The truth of this may be found in the fact

that numbers of dictionaries and books of reference were preferentially bound in Russia leather some thirty or forty years ago, and whereas unused books bound at the same time in the same way now show rotting leather, the reference books which have been continually used are quite sound and supple.

Cow hide is like a magnified calf leather, and shows a slightly pitted surface. It is not often used, but is of much value for very large books that are worth full binding, as one piece of hide could be cut large enough, for instance, to full-bind the *Skibbereen Eagle*, one of the largest Irish newspapers. It would take three or four of the largest goat skins to do this, and it is always advisable to avoid joins, wherever possible, in a binding. But there is one drawback to the use of hide for binding: it is practically impossible to cut it smooth; however skilfully it may be pared, when it gets on the book it is always ridgy. This is, of course, not very important, but it militates against the use of hide except when absolutely necessary. For the rest, hide takes colour well, and it is a very handsome leather, and when it is finished simply with very broad gold fillets it is very ornamental.

Pig skin is perhaps the most familiar of all bookbinding leathers to the outside world, because saddles are made of it. It is a thick, rich leather, and, so to speak, full of life. It is not suitable for small books, but very good for large ones, and has been used in England off and on for a long time, but never very much. Charles Lewis executed some fine examples of his larger bindings in pig skin, but I think he never cared much for it.

Pig skin responds admirably to treatment with lime, the same method of preparation as used for vellum; and this white "vellumised" pig skin has always been the most favoured material for the covering of fine German books of the fifteenth, sixteenth, and seventeenth centuries. Many of these bindings are perfect in their way, covered all over with delicate roll stamps showing marvellous definition and clearness on the hard white surface.

Fine though all their impressions are, it cannot be denied that they are difficult to see; the impressions are shallow, and indeed the designs can often be more easily made out by help of a rubbing with heelball on soft white paper than by examining the binding itself.

Pig skin can be recognised by its smooth hard surface, strongly pitted with bristle holes. It is closely imitated in inferior leather, bristle holes and all, and when such imitation is actually on a book it is very difficult to detect, but if in skin form it can easily be recognised. In real pig skin the bristle holes penetrate right through the leather, and show quite as much at the back as they do in the front, whereas in the imitation they show little, if at all, at the back. Also the back of real pig skin is of very firm, close texture, but the imitation shows a more or less woolly or loose grained back, as it is generally made of sheep skin. French binders have never favoured pig skin much—it is not dainty enough for them.

Sheep skin has always been a favourite leather for bookbinding, but it is not a fine leather and has never been used for first-rate binding. It has, however, been more worked up than anything else into imitations of fine leathers.

The imitation of fine leather in inferior sheep skin has been for a long time a very important industry, and it is one which is still with us. All fine leathers show a particular and well known grain on their surface, but the most largely imitated is that of goat skin or morocco.

In a well grained skin of morocco, the beautiful grain is strongly marked, whether it be "pinhole" or "straight"—so strongly marked indeed that a cast of it can well be made in plaster of paris. From such a cast a metal die can be made, and when this die is strongly pressed upon a prepared piece of sheep skin, which will take an impression extremely well, the result is that a surface is produced which is so exactly like a piece of morocco that even a leather expert may be, and often is, taken in by it. In course of time, however, the impression flattens out, and the fraud betrays itself.

When such a stamped sheep skin is new on a book, and finished with gold, no one would for a moment suspect its genuineness, but if in skin form, the back of the leather will at once betray it. Real morocco has a hard close grain, but the back of the imitation will show a loose soft texture. Other leathers are imitated in the same way: pig skin, lizard skin, and others; and although there has been, and still is, much of such imitation used in the matter of bookbindings, there is still more of it used in the furniture trade.

But putting aside these base uses of sheep skin, it has a very fair record to show on its own unaided merits. Many early Italian bindings, good ones, were made in sheep skin; certainly it has not lasted well, but no doubt when new it was pleasing enough. In England, many of the early fifteenth century panel stamp bindings were made in sheep skin, not quite satisfactory now, but also probably well enough when new.

It is impossible to say much in favour of modern roan, the trade name for sheep skin, which has suffered badly at the hands of the tanner and the dyer; also probably the binders have not been without fault, as in order to get the leather flexible for joints and bands they have acquired a pernicious habit of paring it too thin, and another, equally hurtful, of unduly pulling and stretching it so that the fibres, or what is left of them, get strained and broken.

Skiver is part of a split sheep skin, the surface of which is altogether artificial. It is much used for cheap pamphlet bindings and looks well for the moment, but is not so strong as good paper. It is wonderful how cleverly the “paste grain” or artificial surface of skiver is made; it deceives most people easily. The remaining part of a split sheep skin is prepared quite differently and is made into “chamois” leather. Although this is not used for actual bindings, it is often enough made into linings for loose covers of fine books. It does well for this purpose, but must be kept in a very dry place as it has a certain affinity for damp.

The finest of all leathers for binding is goat skin, morocco as we now call it, from the reputed land of its origin. “Levant morocco” is still

the name of the finest skins. Goats, however, have of course been common enough all over the world for ages, and so we find very ancient bindings in goat skin, quite possibly the most ancient, although I rather incline to vellum in this connection.

Many of the English twelfth to fourteenth century blind tooled bindings are in goat skin, tanned brown, most likely with oak bark, and from that period until now it has always been used here, at some periods more than others.

Goat skin always shows small hair dots in groups all over its surface; it is not quite smooth like calf, and also it shows certain structural striations. In early goat bindings both these marks show clearly, and until the time of Roger Payne in the eighteenth century, the leather was left in its natural state so far as surface marks went.

Italian bookbinders at an early date saw the beauty of natural sunk lines on goat skin, and accentuated them by rubbing in gold leaf. On such bindings the markings on the leather show as fine gold lines; it is a pretty idea, and can often be found on sixteenth century bindings, especially on those that were made for Tommaso Maioli.

French morocco bindings are frequently stained with colour, particularly those which were made about the time of Henri II. in the sixteenth century. The stain is usually put on the fillets or arabesques surrounding a central oval, in which is often a painted coat-of-arms. But as a rule such coloured bindings are in calf, which takes stain more easily than morocco.

Goat leather has never been so much liked by German binders as calf or pig skin. This is partly due to the fact that German bindings are as a rule ornamented with blind tooling, and goat skin is never satisfactory when treated in this way: its grain is against it; but for gold tooling, which has been brought to its greatest perfection by Italian, French and English binders, there is nothing that gives so fine a result as goat leather.

Roger Payne saw and liked the natural grain of goat skin, or, as we may now call it, morocco. But he found that in many cases he could

get a better impression from his very delicately cut stamps in Russia leather. Here, however, he was restricted to one colour, and his favourite colour, a neutral green, could only be procured in morocco. So he ironed the morocco to flatten its natural hills and dales, and produced something like what is now called "crushed" morocco. Payne's smooth morocco is, however, not quite our modern "crushed"; it is smoother, because now we "grain" our leather strongly before crushing it, whereas Payne ironed his without first increasing its natural grain by artificial means. Morocco is often badly injured by the ironing being done with irons that are too hot.

But Payne went a step farther. No doubt he experimented much with morocco, and it is likely enough that before endeavouring to smoothen out his skins he wetted them thoroughly. If he wetted a fine skin of morocco overnight and left it alone, perhaps doubling it or rolling it up, he would have noticed next morning that the natural grain had become much intensified, due to a slight shrinkage of the leather, and showed as a particularly effective breaking up of the surface. Some such chance led him to make definite experiments with a view to exaggerating the natural grain of morocco, and he very soon found out that if a damped skin was well rolled in one direction it assumed permanently what is now known as a "straight" grain. That is to say, the surface of the leather is lined in the same sort of way as a ploughed field is, but not quite so regularly. The ridges and furrows all run in one direction. Several of Payne's bindings are bound in straight grain morocco, but judging from his own work, he never got any farther with his graining.

At a later time, I think towards the middle of the nineteenth century, it was found out that if the process of straight graining was carried out a second time at right angles to the first operation, the little straight furrows and ridges were broken up, and a surface was produced that consisted of a series of minute hillocks, like a field that has been harrowed, and this is known as a "pin-head" grain. Both these grainings improve the strength of the leather, as it contracts after the wetting and also the wear falls on the tops of the ridges or hillocks before it reaches the body of the leather.

French binders have always preferred smooth or crushed morocco for their bindings, as it is easier to gild upon. Morocco is sensitive to damp, and if affected it quickly betrays it by giving out the strong scent of goat which is normally quite absent.

Two new leathers have been recently put upon the market as rivals of morocco: one of these is seal skin and the other the skin of the sea-lion.

Seal skin is finished in the same way as morocco and looks very like it, but it is, I think, not so good. It is softer, more full of oil and has a peculiar, almost fishy, smell. The softness of seal leather makes it unfit for binding books that are likely to have much hard wear, but the oiliness is probably its worst fault, as books standing next to it are apt to be stained. But it is undoubtedly a good-looking and useful leather, and if it can be put upon the market at a less cost than morocco it is sure to have a considerable vogue. Sea-lion skin is only fit for use on big books; it is very strong and is curiously ridged in large ridges. It has the same oiliness that seal has, but not in so marked a degree.

There are, of course, several other leathers in which books have been bound as curiosities, and these are generally noted in some way; a book in the British Museum is lettered outside "Kangaroo," and manuscript notes are in others telling us in what strange materials they are covered. Fish skin, known as shagreen, has sometimes been used for bindings; it is very strong but inelastic, and soon goes at the joints. In the seventeenth century it was largely imitated in calf, stamped with a grain.

Perhaps the most curious leather in which any book can be bound is human skin. Such treasures are by no means unknown. It is said that a friend of Camille Flammarion the French writer, possessed beautiful shoulders, and that when she died she bequeathed her skin to him as he had always admired it. He had the skin tanned and used some of it for a binding of one of his own books, "Ciel et Terre." There are other examples in private ownership, but so far as public libraries are concerned the only instance I know of is now in the

Carnavalet Library at Paris. It is a copy of the Constitution of 1793, and is bound in the skin of one of the revolutionaries who was killed at the time. The skin was tanned at Meudon. Human skin, undyed, looks like thick calf, and it is most difficult to get entirely rid of the hair.

It is to be regretted that of late years the desire for beautifully coloured leathers has induced the need for much treatment before the dyes, mostly aniline, could be properly applied. In the course of this treatment there has been an undue use of sulphuric acid, and the presence of this acid is fatal to the lasting qualities of any leather. Attention has, however, been drawn to the evil from authoritative sources, and now sound leathers can be obtained, and it is to be hoped that the public will second the endeavours of the committee appointed by the Society of Arts by always insisting on the use of sound and certified leather to bind their valuable books in.

BOOKS TO CONSULT.

SOCIETY OF ARTS.—Report of the Committee on Leather for Bookbinding. *London*, 1905.

LIBRARY ASSOCIATION.—Leather for Libraries. *London*, 1905.

CHAPTER VIII.

THE ORNAMENTATION OF LEATHER BOOKBINDINGS WITHOUT GOLD.

Blind tooling and stamping—Panel stamps—Cut leather —Stained calf—Cut vellum—Transparent vellum.

The true binding of a book consists of the sewing of the sections on bands, and the covering of leather is really wanted to protect the threads on the outer surfaces of the raised bands.

But this is generally taken for granted, and now when we speak of the binding of a book we normally mean only the outside ornamentation. In short, the term has changed its meaning; so in the remainder of this chapter, when I speak of the "binding" of a book, it is to be understood as the generally accepted meaning: namely, those parts of the leather covering that are visible.

From an artistic and æsthetic point of view we are justified in considering only the final ornamentation of a book binding. We rightly presume that in all great bindings, and even in the case of most good bindings, the technical procedures have all been truly and properly carried out. It is safe to presume this in the case of all bindings made before the latter half of the nineteenth century, but I regret to say that it is not safe to say it of bindings made then and later. There has been much improper use made of false bands, false headbands, "sawn in" backs, bad leather, and scamped sewing of sections even in books costing upwards of a hundred pounds for their bindings.

The consideration of the ornamentation of leather bindings without the use of gold is of itself a large study, and one that has received much attention of late years. In the trade, ornamental outside work

is called “finishing,” as distinct from the previous work, which is known as the “forwarding.” As a rule, now, these operations are not done by the same hands, but a finisher does the finishing only and makes it his speciality.

Patterns stamped on leather by means of punches or small dies are found in numbers of early instances on horse trappings, shoes and boots, and accoutrements of various sorts; and almost as soon as it was found out that skins of animals could be rendered soft so as to be wearable, it was also found out that they could be ornamented by patterns cut or impressed upon them.

Such patterns are made when the leather is damp and soft, and on drying they become hard and permanent. Many of the earlier impressions made on leather bindings are done by means of hard styles held in the hand and drawn along the leather. Beautiful Celtic interlacings done in this way are found in the ancient Irish “polaires” or book covers. Others are small ornamental stamps which have been impressed on the leather in the same way as we now make an ordinary seal.

One of the earliest instances of a leather binding with ornamental covers is on a Coptic MS. on papyrus, dating from about the eighth century, which has been originally stabbed, and the pattern is an interlacing one with ornamented fillets, between which are impressions from small cameo stamps. In time special tools were carefully cut in hard wood or metal for the avowed purpose of ornamenting leather bindings. The exact date at which this occurred it is impossible to say.

So far as Europe is concerned, the earliest known blind tooled bindings range from about the twelfth century onwards. Earlier books were either covered with the rich metal and jewelled mediæval work that I have already noticed, or else bound in vellum with ties and without ornamentation.

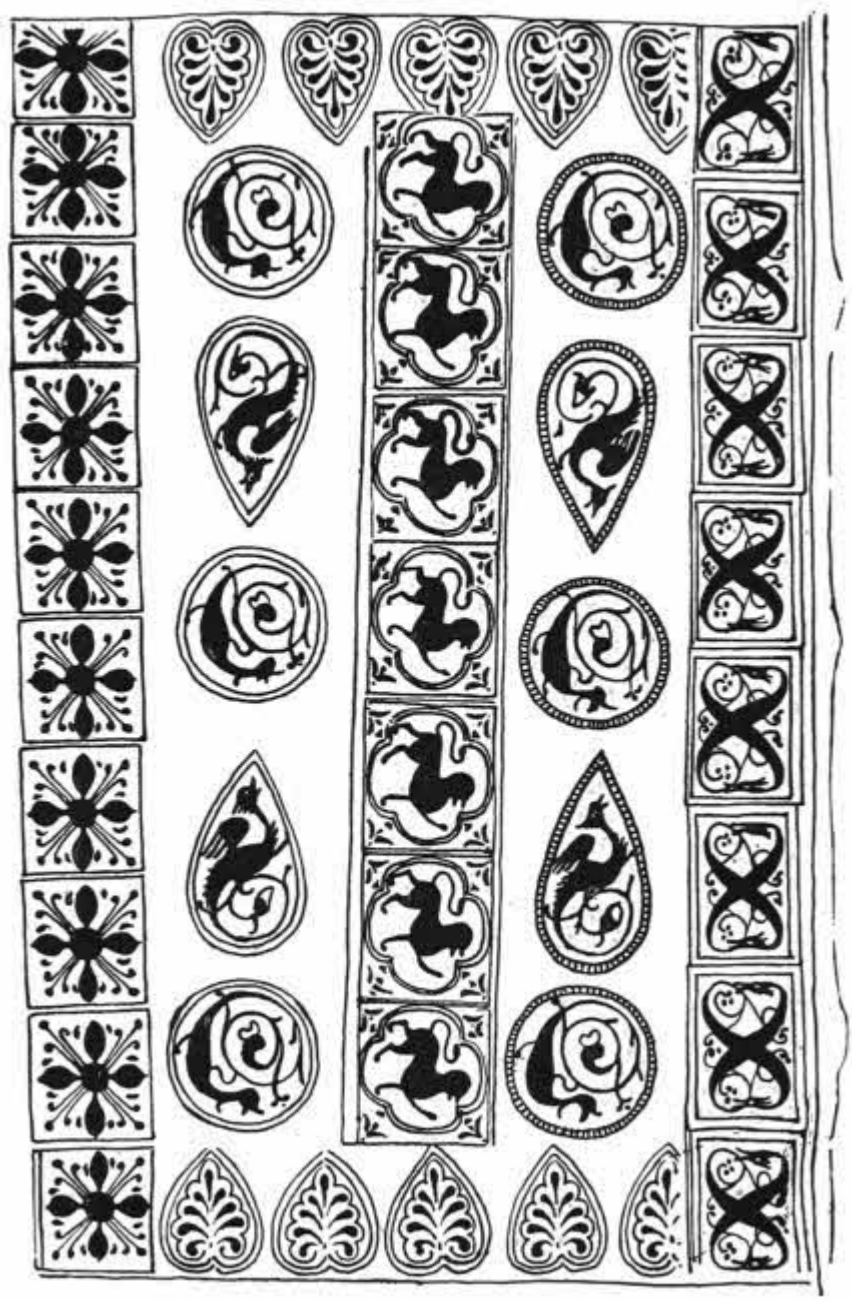

Fig. 86.—English blind tooled binding, 12th century. London.

In England the art of blind tooling reached its highest level from the twelfth to the fourteenth century, and, thanks to the researches of Mr. W. H. J. Weale, there is little doubt that the English excelled in this art. The Germans succeeded best after the English, but German work never approaches the English, either for excellence of general

design or for delicacy and beauty of the small engraved stamps. The English work was on goat skin or calf, the German generally on pig skin.

The stamps used in blind tooling—that is to say, without gold—are cut in the same manner as a seal stone is, only that the cutting is much deeper, and in deep places needs no finishing. When this is pressed upon the soft, damp leather, the leather rises up of itself into the deep hollows cut in the stamp, and so a charming, natural, and apparently much studied relief is automatically given. Such stamps are called "cameo" stamps because of this relief.

The general typical arrangements used by England, Germany, and France in planning out the disposition of the stamps is a subject that is deserving of careful attention by any student of blind stamped work. Some valuable plans of these dispositions can be found in Mr. W. H. J. Weale's *Catalogue of Bookbindings and Rubbings of Bindings in the National Art Library, South Kensington*, and they are well worthy of study.

Roughly, it will be found that the most elaborate of these bindings have come from Durham, London, Winchester, or Oxford, that series of close perpendicular lines of small stamps are characteristic of French early stamped work, and that the marking out of the boards with large lozenges is a German plan. But these types must not be studied alone, as they travelled about freely; the character of the stamps themselves, as well as the leather used, must all receive careful consideration.

London bindings often show perpendicular lines of stamps, sometimes touching, sometimes separate; several of the stamps are round, and others drop-shaped.

The Winchester Domesday Book, now in the library of the Society of Antiquaries, is a beautiful and typical specimen of English twelfth century blind tooling. It is bound in deep brown goat skin, and each side is differently ornamented.

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